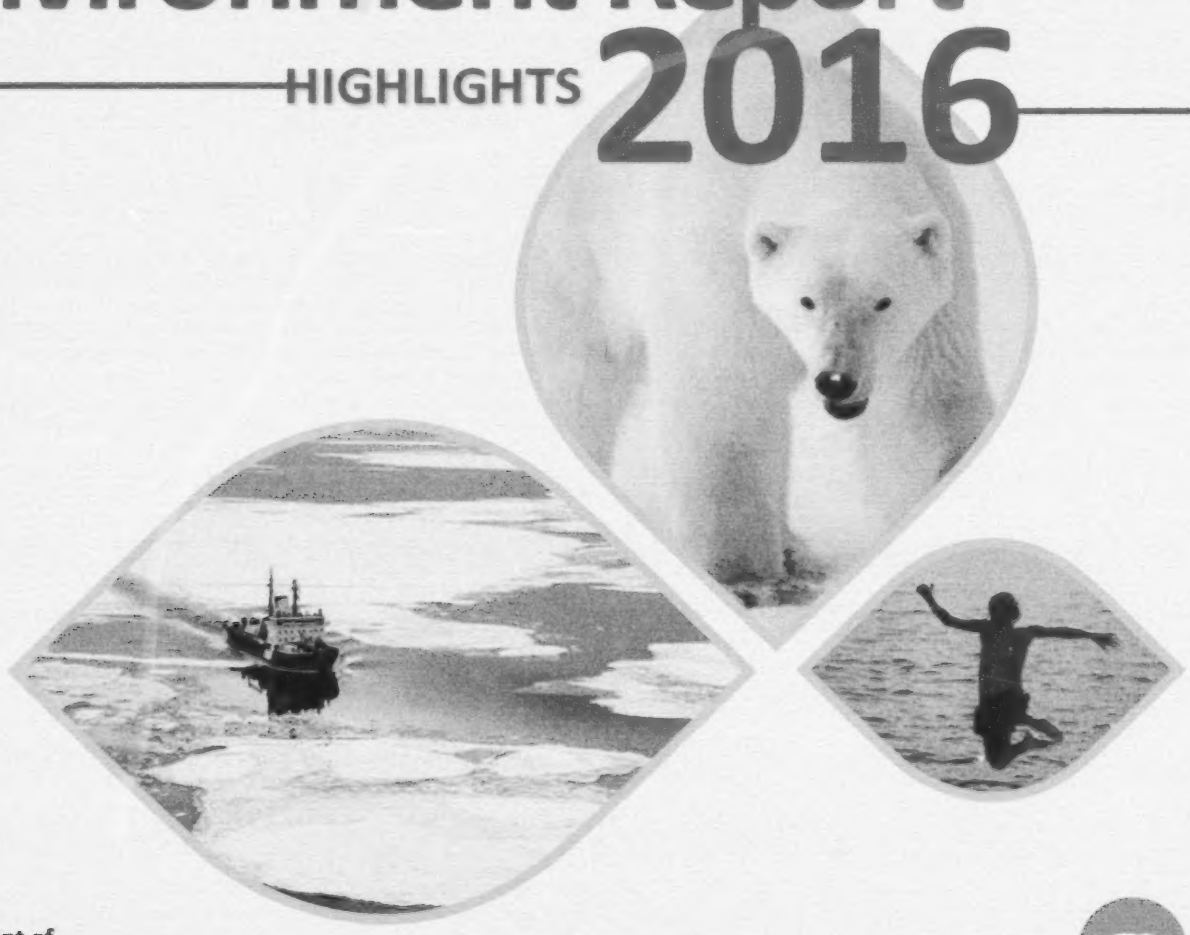
Northwest Territories

State of the Environment Report

HIGHLIGHTS 2016



Government of
Northwest Territories

Photos credit:

Polar bear – Gordon Court

CCGS Amundsen during the Canadian Arctic Shelf Exchange Study in 2003-04. Photo courtesy of © CASES web site – photo gallery.

Child jumping into lake – A. Veitch, ENR

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Message from the Minister

Photo credit: L. Brekke, ENR

A changing climate, human activities and natural fluctuations in the environment are interacting together to transform many aspects of our northern ecosystems. Monitoring and understanding the state of our environment allows us to identify trends and possible early warning signs about current and future environmental changes and the possible impacts on the people, land, water and biodiversity of the Northwest Territories.

The 2016 Northwest Territories State of the Environment Highlights Report is the third in a series of reports started in 2009, which highlights the cumulative effects of the many driving forces and pressures on key components of our environment.

The goal of this Report is to help understand our changing world and identify key information gaps so we can make informed and effective decisions to conserve our environment for current and future generations.

The 2016 Report provides information on six selected focus areas, encompassing climate change, economy and energy, people, water, air, land and ocean.

It is developed by the Department of Environment and Natural Resources, with input from various agencies and many knowledgeable people from the Northwest Territories and beyond. The Report relies on all available sources to track changes in the environment. Traditional, local and scientific knowledge form the basis of information used in the report.

The full online version of the NWT State of Environment Report is available on the ENR website and is updated on an annual basis.

Your comments and input are welcome.

Wally Schumann
Minister
Environment and Natural Resources

Photo credit: L. Brekke, ENR

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Northwest Territories State of the Environment Report

Highlights 2016

The Northwest Territories (NWT) State of the Environment Report is a web-based report providing detailed information on 20 Focal Points in our environment. The goal is to help understand our changing world and make better decisions for actions affecting NWT residents and environment, now and in the future. Each indicator in the full web-based report is updated annually or as new information becomes available. The full online report provides the basis for printed highlight reports published at regular intervals.

This document is the third in a series of highlights reports started in 2009. This report fully integrates information to better highlight the cumulative effects of many driving forces and pressures on key aspects of our environment to better highlight how the environment and people shape each other.

Sharing Our Ways of Knowing

Indigenous peoples in the NWT have used traditional knowledge (TK) and skills to sustain and support their cultures and lifestyle for centuries.

Indigenous cultures in the NWT are enriched and strengthened by the environment in which they live. The importance of TK is recognized by the Government of the Northwest Territories (GNWT) through the Traditional Knowledge Policy, the GNWT Traditional Knowledge Policy Implementation Framework and the Environment and Natural Resources (ENR) Traditional Knowledge Implementation Plan.

While NWT communities and TK holders are primarily responsible for ensuring protection and preservation of TK, the GNWT recognizes it can help through education and programming.

Photo credit: J. McKay, ENR

This document summarizes findings that are fully detailed in the online version of the NWT State of the Environment Report available at www.enr.gov.nt.ca/state-environment

Provide your input, contact NWTSOER@gov.nt.ca.

Photo credit: K. Trembath, ENR

This partnership promotes cultural survival and allows the GNWT to benefit from the knowledge that is shared.

The NWT State of the Environment Report relies on all available sources of information to track the changes in the NWT environment. Traditional, local and scientific knowledge form the basis of information for many indicators.

Some of the indicators specific to TK in the NWT State of the Environment Report include trends in the proportion of Indigenous people who speak an Indigenous language and the number of camps and educational activities where children are taught TK from their elders. The GNWT currently provides opportunities for elders and Aboriginal youth to spend time on the land in meaningful activities where culture and language can be taught. TK is most successfully transmitted when learning barriers and gaps in context are removed.

Key Information Gaps in 2016

- All mountainous ecozones in the NWT lack climate data.
- Additional work on valuation of ecosystem services is needed to better account for the economic effects of both climate change and the cumulative impacts of development decisions on society's access and use of these services.
- An authoritative and validated dataset on seismic line location and regrowth rates still is not available. These are necessary to assess the cumulative effects of landscape change on water resources and wildlife.
- More TK studies are needed on species at risk, water, land and ocean changes.
- Gaps in monitoring programs prevent the tracking of changes in insects and how these changes could be impacting our bird populations and our forests.

Photo credit: Jane Lancaster

Find Out More

The NWT State of the Environment Report – Highlights 2016 is available online at: www.enr.gov.nt.ca/state-environment/highlight-and-special-reports.

The full NWT State of the Environment Report is available at www.enr.gov.nt.ca/state-environment.

Additional information on the state of the NWT's environment is available on-line at:

- www.biodiv.ca (Canadian Biodiversity: Status and Trends Report 2010)
- www.mrbb.ca (Mackenzie River Basin Board)
- waves-vagues.dfo-mpo.gc.ca (State of the Ocean Report for the Beaufort Sea Large Ocean Management Area)

For more information regarding TK in the GNWT, go to http://www.enr.gov.nt.ca/programs/traditional-knowledge/annual-reports.

CLIMATE CHANGE

The Arctic is warming very rapidly.

Concentrations of greenhouse gases in the Earth's atmosphere now far exceed the highest levels recorded in ice cores during the last 800,000 years. Greenhouse gas levels are increasing very fast and, since about 1750, are mostly due to human activities. Most emissions in the NWT are from mining, space heating, transportation and electricity generation. On a per capita basis, Canadians are among the five highest producers of greenhouse gases in the world, with Americans and Australians. China is the highest producer in total emissions by country.

In the NWT, warming temperatures are most notable in winter. In forested areas of the NWT, spring conditions were wetter than normal for about 20 years, but have been much drier during the past five years. In 2013, the NWT experienced the least amount of snow in the winter and the driest fall and spring on record. Due to increased warming, Arctic sea ice cover will continue to shrink and ocean levels in the Beaufort Sea are expected to rise by up to one metre by 2100.

Permafrost degradation is altering our terrestrial and aquatic ecosystems. In the northern NWT, where permafrost is ice-rich, thawing is creating land slumps. These are nutrient rich disturbed areas that favour the growth of shrubs and are changing water quality downstream. In forested regions, the active layer (the top layer of soil that thaws each summer) is increasing in thickness and staying unfrozen longer each year. The rate of change is influenced by how much ice is in the underlying permafrost and by feedback effects from changing vegetation cover and soil moisture, especially after wildland fires and other land disturbances.

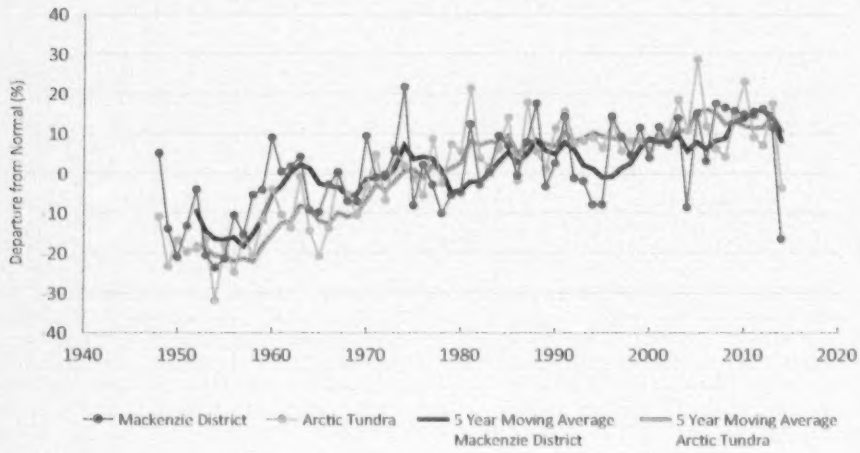
These changes are not happening at a constant rate. Natural fluctuations, such as the current El Niño event, can amplify the effects of climate change in the NWT. Some years, environmental changes can be fast or unpredictable.

Photo credit: J. McKay, ENR

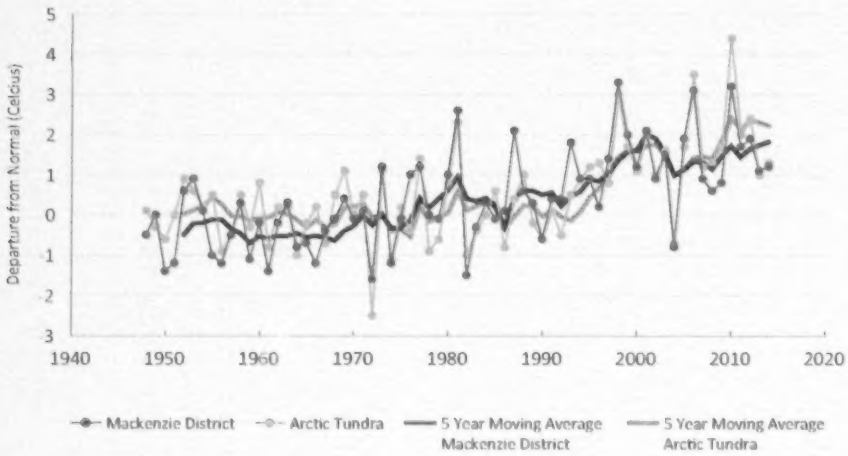
Key Insights

- The NWT is experiencing faster changes in climate than most other regions in the world.
- Winters are warming and annual precipitation is more variable, rapidly changing from wetter conditions to drought periods.
- Natural fluctuations, like the current El Niño event, can amplify the effects of climate change.
- Some years, environmental changes can be fast or unpredictable.

Annual Precipitation



Annual Temperature



The information in this highlight section was based on the following State of the Environment Report indicators:

Driving Forces

1.1 Trends in global Co_2 concentrations
1.3 Projected trends in temperatures and precipitation in the Arctic
1.4 Trends in Arctic sea ice
1.7 Projected sea rise levels in the Beaufort Sea
2.2 Pacific Decadal Oscillation Index and El Niño/La Niña
3.1 Trends in observed seasonal weather compared to normal
3.2 Trends in length of growing season and snow cover
6.3 Trends in NWT greenhouse gas emissions

State

13.1 Ground temperature in permafrost zones
13.2 Trends in active-layer thickness in the NWT
13.3 Trends in thermokarst in the NWT

See all indicators in www.enr.gov.nt.ca/state-environment

FOR MORE INFORMATION
Visit www.nwtclimatechange.ca.

ECONOMY AND ENERGY

All human activities, including all regional, national and global economies, are ultimately possible because of resources and services provided by the environment.

The NWT economy is largely reliant on resource industries, and follows a "boom and bust" pattern. As prices for non-renewable resources go up or down, prospects for exploration and development of the NWT's resources also change. These rapid changes in the economic outlook have been, and remain, a driving force for long-term changes in the NWT environment.

Exploration and development of resources result in landscape changes that can be semi-permanent, such as roads and pipelines. Seismic lines can be present on the landscape for many decades, especially where disturbance degrades permafrost and creates wetter conditions.

The traditional economy can also follow a "boom and bust" pattern. Variable prices on international markets for renewable resources, such as marten fur, as well as natural cycles in wildlife population numbers, are the main causes for large variations in trapping activity. Marten is the most important species in terms of revenue for the NWT fur industry and the price of marten pelts varies with the global economy.

Our economic health is linked to our use of ecosystem services, which can be disrupted by a changing climate or by past economic decisions. Warmer winters result in uncertainties in ice road use and permafrost thaw results in increased expenditure on infrastructure, including transportation. Recent drought conditions have resulted in low water levels, which are straining our capacity to use important ecosystem services, such as generating enough electricity for our current needs and the ability to transport essential goods to communities along the Mackenzie River.

A changing climate has economic consequences. Wildland fires are normal phenomena in northern forests. They reduce forest pest populations and rejuvenate our forests. However, longer growing seasons are resulting in longer wildland fire seasons. In some years, dry conditions lead to record numbers of wildfires and larger firefighting expenditures.

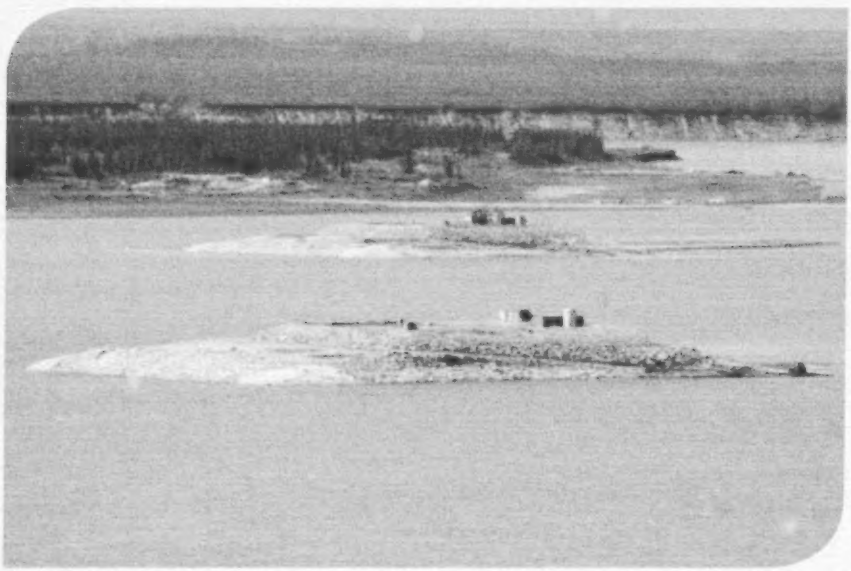
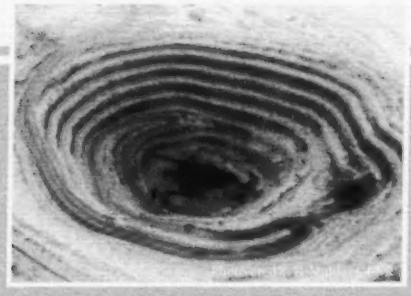


Photo credit: S. Yuill, ENR

Key Insights

- Today's economic decisions have long-term effects on the NWT environment.
- The majority of energy consumed in the NWT is from fossil fuels.
- Our economic health is linked to important ecosystem services.
- Environmental changes due to a changing climate are straining our ability to gain full benefits from some of these services.
- Global economic decisions and a changing climate are impacting our ability to use local food resources.



Expenditures related to remediation of contaminated sites from past industrial and military activities have increased in the past decade. More than 50 percent of remediation expenditures in the NWT are for work at two former gold mines, Colomac and Giant. Past experience and the rapidly rising costs related to clean-up and remediation of industrial sites are leading to higher standards in environmental procedures at new mines and other industrial developments. The number of local spills of substances deleterious to the environment has declined during the past five years due to a decline in activities of the resource industry.

Global economic decisions, coupled with climate change, are affecting our ability to use local food resources. Increased emissions of pollutants from countries around the world are transported to Polar regions and accumulate in cold environments such as ours. Longer summer seasons allow for increasing bioaccumulation of locally occurring mercury in fish. Public health advisories have been issued for some large predatory fish in a few lakes in the NWT.

Energy and the environment are linked. NWT energy use per person is nearly double the Canadian average because of our cold climate. The largest portion of energy consumed in the NWT is by industry and the majority of it is from fossil fuels. The Energy Action Plan addresses how the NWT can reduce the high costs of energy and promote the use of renewable energy, including adaptive hydro-electricity generation, biomass, solar, wind and geothermal energy sources.

Photo credit: GNWT/B. Starling, ENR

The information in this highlight section was based on indicators from the following State of the Environment Report focal points:

Driving Forces

1. Big Picture – Changing Planet
5. Economy
6. Energy

Pressures

10. Contaminants

State

11. Water
13. Permafrost

Stewardship

19. Environmental Awareness and Education

See all indicators in www.enr.gov.nt.ca/state-environment

FOR MORE INFORMATION

Visit www.iti.gov.nt.ca/publications/northwest-territories-energy-action-plan-december-2013.

Mercury in fish: www.hss.gov.nt.ca/health/environmental-health/mercury-levels-fish

PEOPLE

People are part of the environment.

The NWT population has not experienced a rapid increase as seen in some other regions of Canada. In fact, the NWT has been a net exporter of people over the past five years. The NWT population, similar to the rest of Canada, is aging and people are becoming more urban. About 75 percent of NWT residents live in medium to large communities and this proportion is increasing. People define themselves by where they live and each ecozone in the NWT, from tundra to boreal forest, harbours its own unique human culture and pattern of land use. Where people live in the NWT can be indicators of present and future links to ecosystem changes.

Aboriginal languages have rich and unique qualities, which enhance our understanding and knowledge of the environment. The portion of NWT people who can speak an Aboriginal language is in steady decline. These languages are vital to preserving TK, and in expressing and preserving stories in a specific environment. Loss of these languages can result in the loss of environmental TK. In the NWT, the land and the environment cannot be separated from culture. This tie between land and culture means protecting areas with cultural significance often simultaneously protects areas of ecological importance. All archaeological sites in the NWT are protected by legislation and about 15 percent of all known sites are in a larger protected area affording landscape-level protection.

Key Insights

- More people are moving out of the NWT than moving in.
- Within the NWT, people are moving to larger communities.
- Country food use and use of Aboriginal languages are declining.
- Fifteen percent of known archaeological sites are in large protected areas.
- Human activities, air traffic and resource exploration overall have declined since 2008.

Photo credit: R. Mulders, ENR

Photo credit: D. Allaire, ENR

Photo credit: D. Allaire, ENR

The NWT has very low and stable human density. However, human activities can increase significantly in years of high economic activity. Not all air and road traffic disturbs wildlife, but increased activity, such as road traffic noise and dust, has been linked to a reduction in effective habitat availability for some species. Changes in airport activities reflect global economic trends and changes in exploration activities in the NWT. Tracking licences for mineral and oil-gas development provides insights on where industrial activities occur each year. Land under prospecting and mineral claims in the NWT reached a peak in the 1990s during the diamond staking rush in the barrenlands. Mineral claims then declined to a low in 2001-2004. A second rush in 2004-2007 was related to renewed exploration for diamonds and other minerals such as gold, base metals, rare earth elements and uranium. This exploration was diversified and occurred in all NWT ecozones. Oil and gas exploration and mineral claims have declined since 2008. These declines are closely linked to the global economy.

The number of people who reported they hunt or fish has remained unchanged for the past 15 years. However, country food no longer provides the majority of meals in the NWT. The number of households that report that most of the meat or fish they consume is obtained from hunting or fishing is declining. This trend is more pronounced in large communities. The number of people who visit the NWT to hunt or fish is also declining. Other types of tourism, outdoor adventure and general touring are showing mixed results.

Individual NWT residents can help reduce pressures to the environment. The GNWT Beverage Container Program and more accessible recycling programs, implemented in the 2000s, are proving a success.

Humans can be a driving force in future changes in our environment. The environment will continue to fashion our cultures and our society, now and in the future.

Photo credit: D. Allaire, ENR

The information in this highlight section was based on the following State of the Environment Report indicators:

Driving Forces

4.1. Trends in demography in NWT ecozones
4.2. Trends in Aboriginal languages in NWT ecozones

Pressures

7.1 Trends in air traffic
7.2 Trends in road traffic
7.4 Trends in development activities requiring a permit in the NWT
9.1 Trends in percent of beverage containers that are returned for reuse and recycling

Stewardship

18.2 Trends in fishing and hunting
18.3 Country food use in NWT Ecozones
18.4 Trends in trapping in the NWT
18.6 Trend in visitors to NWT Territorial and National Parks
19.1 Trends in field environmental education opportunities for youth
19.2. Changes in environmental awareness programs
20.4 Trends in cultural conservation

See all indicators in www.enr.gov.nt.ca/state-environment

WATER

Water is life.

As humans we rely heavily on water resources. We drink it, eat food from it, and live and travel on it. Throughout the NWT, water resources are abundant and water quality is generally very good. However, the effects of climate change have become increasingly evident in the North. With increasing demands for water and a changing climate, it is important that we mitigate and adapt to take care of our water resources.

Climate models indicate the Arctic will have shorter, warmer winters, with more precipitation and longer, drier and, slightly, warmer summers. Along the Mackenzie Valley, precipitation patterns are becoming more variable. Fall 2013 was the third driest on record and winter 2013-2014 received the least amount of snow on record. The following 2014-2015 season remained relatively dry, causing drought conditions, with low water levels in Great Slave Lake and other aquatic systems.

The flow of water is a vital part of many ecosystems, especially in northern rivers where winter flow can be very low. Winter flow is crucial for overwintering fish in providing appropriate water temperature and sufficient dissolved oxygen levels for fish survival. Winter low flows are increasing in all monitored rivers in the

Key Insights

- The amount of water flow in winter is increasing across all monitored rivers in the NWT.
- Drought conditions have affected water levels of Great Slave Lake and other lakes and rivers in the NWT.

Photo credit: L. Brekke, ENR

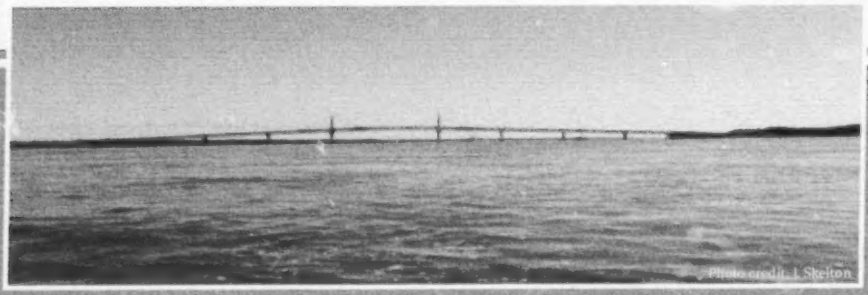


Photo credit: L Skelton

Photo credit: A Krisch

NWT and all major watersheds. Possible reasons for these winter flow changes could be warmer autumn and winter temperatures that delay ground freezing and change the timing and amount of groundwater contribution. Climate change forecasting for the Mackenzie River Basin predicts increases in temperature and changes in precipitation patterns and timing, which would continue the increasing trend in winter low flow.

The Slave River flows from Alberta into the NWT and is the largest tributary of Great Slave Lake, contributing 77 percent of its inflow. The Bennett Dam in British Columbia was completed in 1968, creating the Williston Reservoir in the upper reaches of the Peace River, the main tributary of the Slave River. The dam and reservoir regulate the flow of the Peace River for hydro-electricity generation, which affects the flow of the Slave River. Although natural processes downstream of the reservoir can mask some of the effects of flow regulation, winter low flows in the Slave River have increased by 75 percent and spring maximum flows have been reduced by 20 percent. It is important to note, however, that the total amount of water flowing in the Slave River over the course of a year has not changed; only the timing of when the water arrives has.

Concentrations of major ions in rivers flowing through the Taiga Shield are usually very low, but are increasing. In particular, the concentration of major ions has increased in the Yellowknife and Cameron rivers since the late 1990s. Major ions refer to certain elements, such as calcium, sodium, potassium and magnesium, which make up most of the ions occurring naturally in the water. These elements come from the surrounding landscape and the material through which the rivers flow. These changes suggest water running off the landscape is spending more time in contact with surface materials than in the past. Numerous factors may be responsible for this. These include changes in the timing and amount of seasonal precipitation and a longer duration of seasons when the ground remains unfrozen. These types of changes have been noticed in other major rivers across the Arctic and subarctic and are not unique to rivers of the Taiga Shield.

Photo credit: A Krisch

The information in this highlight section was based on the following State of the Environment Report indicators:

Driving Forces

1.3 Projected trends in temperatures and precipitation in the Arctic

3.1. Trends in observed seasonal weather compared to normal

State

11.1 Trends in winter flow in NWT rivers

11.2 Trends in Slave River flows

11.3 Trends in Great Slave Lake levels

11.4 Trends of turbidity in the Slave and Hay rivers

11.6 Trends in water quality from three rivers on the Taiga Shield and Taiga Plains of the NWT

13.3 Trends in thermokarst in the NWT

See all indicators in www.enr.gov.nt.ca/state-environment

FOR MORE INFORMATION

To find out more on how NWT people are working together to address complex water issues and concerns, visit the NWT Water Stewardship Strategy at www.nwtwaterstewardship.ca.

AIR

Clean air is a precious resource.

Air contaminants at certain concentrations can cause human health issues, such as respiratory and cardiovascular problems, and potentially negative effects on wildlife and the environment. Naturally occurring levels of particles and chemicals in the air are called background levels. Human activities and naturally occurring phenomena, such as wildland fires, can cause those levels to increase. Tracking and establishing maximum limits for these levels is important for protecting human health and the environment.

The NWT participates in a program to monitor "Criteria Air Contaminants" (CACs), a suite of common trace particles and gases found in the air around us. CACs include total suspended particulate (TSP), particulate matter 10 microns or less in diameter (PM_{10}), particulate matter 2.5 microns or less in diameter ($PM_{2.5}$) and gaseous pollutants, including sulphur dioxide (SO_2), nitrogen oxide (NO_x), carbon monoxide (CO) and ground level ozone (O_3). These are monitored to give an indication of air quality by comparing the level being measured to national and territorial standards, which establish limits for the maximum amount of particles and gases in ambient air. Monitoring to date generally confirms the expected very low readings for most air contaminants measured in NWT communities, with concentrations well within established air quality standards.

Notable exceptions include the influence of wildland fire smoke and dust events from road gravel after a thaw period.

Summer 2014 was an exceptionally active wildfire season, with very high ambient particulate ($PM_{2.5}$) measurements. A high number of days exceeding maximum standards were recorded in Yellowknife as a result of the smoke from regional fires.

Key Insights

- Air quality in the NWT is normally very good.
- Due to wildland fire smoke in summer 2014, air quality in Yellowknife did not meet national standards for 38 days.

Photo credit: J. McKay, ENR

Photo credit: R. Gregory, ENR

The NWT Air Quality Monitoring Network tracks air quality in Yellowknife, Inuvik, Fort Liard and Norman Wells. Although the NWT has relatively limited industrial development and small communities, resource extraction activities, such as the oil and gas industry in the NWT and in Alberta, are likely to increase in the future. This increase in industrial activity will cause more air pollution. It is important that baseline conditions are established before a large increase in activity happens. This will provide a basis for comparison and management of air quality and emissions.

2004-2014 Summary: Yellowknife $PM_{2.5}$

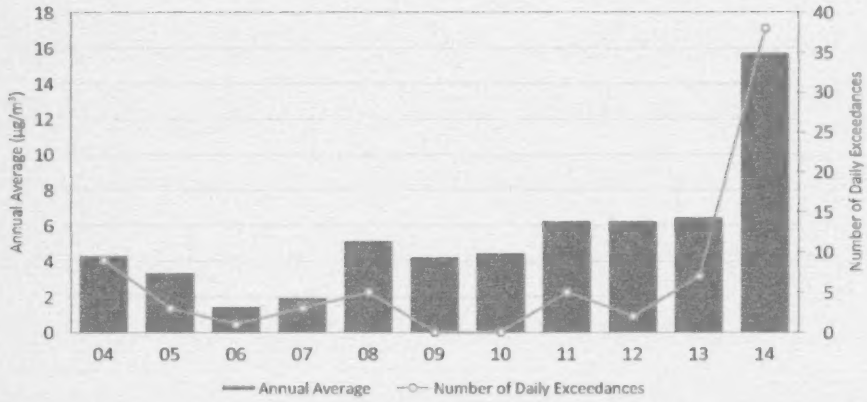


Photo credit: L. Brekke, ENR

The information in this highlight section was based on the following State of the Environment Report indicators:

Driving forces

2.2 Pacific Decadal Oscillation Index and El Niño/La Niña

3.2 Trends in length of growing season and snow cover

State

12.1 Criteria Air Contaminants Indicator

14.3 Annual area burned and number of fires

Stewardship

19.2 Changes in environmental awareness programs

See all indicators in www.enr.gov.nt.ca/state-environment

FOR MORE INFORMATION

To learn more about where and how air quality is monitored in the NWT, go to aqm.enr.gov.nt.ca/

LAND AND OCEAN

NWT ecosystems are changing in both subtle and dramatic ways.

Some drivers of change in NWT landscapes can be directly related to human activities. The most significant of these are seismic lines. Due to uncertainties about the rate of regeneration on seismic lines and differing data sources reporting new seismic lines, it is difficult to quantify precisely the current density of these features on the landscape. The highest seismic line densities are in the Mackenzie Delta, Liard Valley and Cameron Hills. Studies to better assess and understand the ecological processes regulating regeneration on seismic lines are ongoing. Other linear features, such as road density, remain among the lowest in Canada.

The total area harvested commercially for timber during the last few years was very small. Forest Management Agreements and the NWT Biomass Energy Strategy will allow for sustainable timber and biomass harvest in designated areas for the next 25 years.

Significant drivers of change in NWT's landscapes are indirectly related to human activities. Climate change is resulting in increased growth and distribution of shrubs on the tundra and more slumping in ice-rich lands. In areas of discontinuous permafrost, fens and bogs are increasing, while forested areas underlain by permafrost are being lost.

Key Insights

- There is an increase in growth and distribution of shrubs on the tundra.
- The wildland fire season is getting longer.
- Permafrost loss, wildland fires and exploration using seismic lines are the most significant drivers of change in NWT landscapes.
- Ocean acidification is happening faster in the Beaufort Sea than predicted. Acidification will result in profound changes to our marine ecosystem.

Photo credit: Kris Maier

Photo credit: Suzanne Carriere, ENR

Photo credit: Paul Vessel, Golder Associates

Wildland fire is a major natural disturbance initiating stand renewal in the boreal and taiga forest around the world. On average about 600,000 ha (6,000 km^2) of forest in the NWT burn each year. This number fluctuates significantly depending on weather conditions. A record 3.4 million hectares (34,000 km^2) of forest was affected in summer 2014. With climate change, the fire seasons are predicted to be longer with more frequent and extreme fire events.

Protected areas are a way to conserve biodiversity, now and into the future. Currently 188,200 km^2 of land (including fresh water), or 13.8 percent of the NWT, is designated as conservation areas. Conservation planning, including ecological representation network planning, is underway.

The Beaufort Sea is changing rapidly. Ocean acidification as a result of a global increase of CO_2 in the atmosphere was predicted to be detected in the Arctic Ocean in the next decade. There is already evidence that strong acidification of the Beaufort Sea is underway. This will negatively impact important marine organisms like clams, which need low acidity to build their shell. Other interrelated changes include: rise in sea levels; rapid reduction in multi-year ice replaced by thinner ice that is more responsive to winds and breaks apart; periods of very high salinity at the ocean bottom and declining salinity at the surface; and changes in seasonal mixing of water resulting in changes in the food web. The Beaufort Sea ecosystem is changing in complex ways, ultimately affecting fish and marine mammals important to NWT's coastal communities.

Melting sea ice is leading to increased shipping in the Northwest Passage. A record number of 30 vessels went through the Northwest Passage in 2012. The very first commercial transit of a cargo container occurred in September 2014. Most trips are still made by very small vessels and only in months with low ice hazards (August to October). Potential environmental effects of increased shipping include higher risk of oil or waste spills, changes in ice conditions caused by ship wakes, and impacts on wildlife and marine species.

Marine ecosystems have significant ecological, cultural and economic value to the NWT. At present, the Tarium Niryutait Marine Protected Area is the only marine protected area off the coast of the NWT. However, a process is underway to identify and establish additional protected areas.

Photo credit: GNWT/A. Krisch, ENR

The information in this highlight section was based on indicators from the following State of the Environment Report focal points:

Driving Forces
1. Big Picture – Changing Planet

Pressures
7. Human Activities
8. Landscape Changes

State
13. Permafrost
14. Vegetation

Stewardship
20. Ecosystem Conservation Planning

The information on the ocean was summarized from "State of the Ocean Report for the Beaufort Sea Large Ocean Management Area", DFO. 2012. Available at www.dfo-mpo.gc.ca/Library/345203.pdf

See all indicators in www.enr.gov.nt.ca/state-environment

FOR MORE INFORMATION

To learn more on forest fires, go to www.nwtfire.com.

To participate in protected area planning, management and monitoring, go to www.nwtpas.ca and www.pc.gc.ca.

BIODIVERSITY

Northern biodiversity thrives in a harsh climate.

The NWT is home to few species, but these are adapted to our northern climate. Some, such as Peary caribou, whooping crane, hairy braya and Nahanni aster, found mainly in the NWT, are rare or not present elsewhere on the planet. The group most at risk of extirpation are frogs and toads (amphibians). The group with the largest increase of extinction risk during the past decade are migratory birds. Forty-two species, or less than one percent of all known species in the NWT, are at risk of disappearing. This is very low compared to other jurisdictions in Canada. Northern ecosystems have small food webs where the loss of one keystone species can have significant and very long lasting impacts on the whole environment.

Changes in biodiversity have been observed with a rapidly warming climate. Overall, spring arrives earlier, the growing season is longer and the snow season is shorter. Warmer winters allow some insect pests, parasite species, competitors and diseases already established in southern Canada to move and survive farther north. Examples of these new threats already in the NWT include winter ticks on moose and mountain pine beetles. Also expected to move north in the next decade is white-nose syndrome in bats. Some parasites and diseases already present in northern ecosystems that have caused little harm will have larger impacts on northern populations due to the cumulative effects of other stresses, such as drought, disturbance and habitat loss. These cumulative threats are causing population losses in bumble bees and amphibians, such as the northern leopard frog and western toad.

Complex interactions among climate change, diseases, pests, habitat change and other stressors are also likely responsible for recent declines of muskox on Banks Island, anthrax outbreaks in wood bison, and barren-ground caribou declines across the NWT. These complex interactions are being studied.

Photo credit: GNWT/D. Deware, ENR

Key Insights

- Most barren-ground caribou herds are still in decline.
- Less than one percent of our species are at risk of disappearing, but some insect-eating birds and bumble bees previously common are in sharp decline.
- Climate change is a factor in the decline of most northern species.
- Northern ecosystems have small food webs where the loss of one keystone species can have significant and very long lasting impacts.

Photo credit: M. Oldham, ENR

Photo credit: Anne Gunn, ENR

Climate change can also lead to so-called "climate ecological mismatch". This occurs when there is a mismatch between the timing of food availability (e.g., when insects come out) and the timing of breeding in migratory species, such as some birds. When this mismatch occurs over many years, it leads to population declines. Elders in the NWT have noted for many years that migratory birds are in sharp decline. Bird monitoring has shown most shorebirds nesting in the Arctic are declining and many boreal birds that feed on aerial insects are declining.

NWT landscapes are relatively pristine. However, the NWT is home to animals that require large tracts of habitat to thrive, including boreal caribou, polar bear, grizzly bear and wolverine. Boreal caribou are easily affected by habitat fragmentation, roads and other linear disturbances (seismic lines), which help predators move around, resulting in increased predation. The rapid melt of sea ice is changing how polar bears use their habitat in complex ways, resulting in more people-bear conflicts and some polar bear population declines, especially in the southern Beaufort Sea.

Caribou are an important part of the cultural heritage of the NWT. Most barren-ground caribou herds in North America are in decline or remain small. Although the Porcupine herd is increasing, the Tuktoyaktuk Peninsula, Cape Bathurst, Bluenose-West, Bluenose-East and Bathurst herds continue to decline. The Beverly, Ahiak and Qamanirijuaq herds may also be in decline. Declining herds are not as resilient to hunting, disturbances, habitat changes and other threats. It is important that overall management goals are put in place to decrease the impact of human activities on the species and allow for the conservation of these herds for future generations.

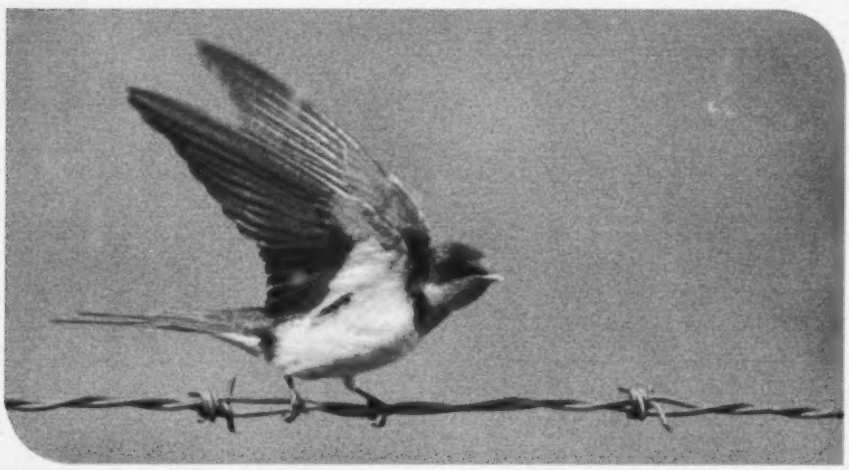


Photo credit: Gordon Court

The information in this highlight section was based on indicators from the following State of the Environment Report focal points:

Driving Forces
3. Climate and Weather

Pressures
7. Human Activities
8. Landscape Changes

State
15. Wildlife
16. Species at Risk
17. Genetic Resources

See all indicators in http://www.enr.gov.nt.ca/state-environment

FOR MORE INFORMATION

To find more on species at risk go to www.nwtspecieatrisk.ca.

To find more on caribou herds, go to www.enr.gov.nt.ca/programs/barren-ground-caribou.

To learn more and help prevent the introduction of invasive species in the NWT go to www.enr.gov.nt.ca/programs/invasive-alien-species.

Sources and Acknowledgment

The 2016 Highlights of the NWT State of the Environment Report was prepared by a team with members from each division of Environment and Natural Resources (ENR), Government of the Northwest Territories (GNWT). The team would like to acknowledge the help of many people who provided or reviewed data and information for their considerable contributions. All errors and omissions remain the sole responsibility of the team. Climate, weather and El Niño information are obtained from the Intergovernmental Panel on Climate Change, Environment Canada and National Oceanic and Atmospheric Administration (NOAA), USA. Permafrost findings and vegetation changes are from local knowledge holders, NWT Geological Survey, Natural Resources Canada and many university researchers. Data on the economy, energy use, population, Aboriginal languages, hunting, fishing, country food use and recycling are from the NWT Bureau of Statistics, supplemented by information from Industry, Tourism and Investment (ITI), GNWT, the Energy Division, Public Works and Services, GNWT and the Field Support Unit, ENR. Data on road traffic are from Transportation, GNWT, and on air traffic from Statistics Canada and Transport Canada. Tourism information and park use data are from Parks Canada and the Tourism and Parks Division, ITI. Data on land rights issued are obtained from Mining Recorder's Office and Office of the Regulator of Oil and Gas Operations, ITI. Seismic lines data are from the National Energy Board and Land and Water Boards. Water data and information are obtained from Water Survey of Canada, community-based studies and research coordinated under the NWT Water Strategy by the Water Division, ENR, and by Sir Wilfrid Laurier University. Air quality data are from the Environment Division, ENR. Timber harvest and wildland fire data are from the Forest Management Division, ENR. Protected area data and conservation planning information are obtained from the Conservation, Assessment and Monitoring Division, ENR. Data on shipping in the Northwest Passage are from NORDREG. Sea ice data are from the Canadian Ice Service and NOAA. Information and data on invasive species, species at risk, wildlife and ecosystems are obtained from community information holders, renewable resources boards, the Wildlife Division, ENR, Environment Canada, Fisheries and Oceans Canada (DFO), NatureServe Canada and from results of many collaborative traditional knowledge and scientific studies and monitoring programs on wildlife. Additional information on acidification and other oceanic changes was obtained from DFO's "State of the Ocean Report for the Beaufort Sea Large Ocean Management Area" and Woods Hole Oceanographic Institution, US.

Find More

Lists of all contributors and sources can be found for each indicator in the full report. Visit www.enr.gov.nt.ca/state-environment.

Many studies used to report on the NWT environment are coordinated and funded by the NWT Cumulative Impact Monitoring Program (CIMP) and can be found online at www.nwtcimp.ca.

The NWT Discovery Portal (www nwtdiscoveryportal.enr.gov.nt.ca) is the online source for environmental monitoring knowledge in the NWT.

NWT CIMP facilitates the NWT Environmental Audit every five years as mandated by the *Mackenzie Valley Resource Management Act.* Audit reports are available online at www.nwtcimp.ca

Contact

Your input is important. Your suggestions on additional indicators and your insights on how the NWT's environment is changing are appreciated.

Contact us at NWTSOER@gov.nt.ca.